Service Manual

WS SERIES

PACKAGE UNITS

And

SPLIT SYSTEM

WATER SOURCE
AIR CONDITIONERS

UNIQUE

Advanced air conditioning systems

Contents

SAFETY FIRST! 4

1. INTRODUCTION 5
2. TECHNICAL DATA TABLES 8
3. WATER SOURCE CONSOLE UNITS 11
4. SPLIT CONDENSER UNITS 12
5. HEATING ELEMENT RECOMMENDATIONS 13
6. REFRIGERATION CYCLE DIAGRAMS 14
7. INSTALLATION INSTRUCTIONS 16
8. INSTALLING THE CONTROL SYSTEM AND CONNECTING POWER... 22
9. ELECTRICAL WIRING DIAGRAMS 25
10. TROUBLESHOOTING GUIDE 31
11. CONTROL PROGRAMS and OPERATION INSTRUCTIONS 37

SAFETY FIRST!

Safe operation is UNIQUE's number-one priority when designing products. Please read all the safety information and the instructions completely prior to beginning the installation and operation of the unit.

UNIQUE products are designed for HVAC use. Using this equipment for any other purpose or in a way not within the operation recommendations specified in this manual will void the warranty and may cause injury. This manual is designed to provide comprehensive installation/operation information for this UNIQUE product. The table of contents provides a convenient overview of the information in this manual.

Follow Safety Instructions! Carefully read all safety messages in this manual and on the equipment. Follow recommended practices and safe operating practices. Keep Safety Signs in good condition. Replace missing or damaged Safety Signs.

Danger! In plannig the location of the equipment, take into consideration any areas that could present an unsafe situation. Avoid power lines that could come into contact with the equipment.

Warning! – Electrical Safety. To avoid electrical shock, place equipment in a safe area, use guards around control panels and always shut off and lock out control boxes when working on equipment.
In selecting electrical equipment to be used with the installation, you must use equipment conforming to applicable local or international codes or regulations.

Important! Check all equipment for warning, danger and Caution Decals, before equipment is operated.
Do not by-pass or take shortcuts with electrical safety equipment. Make sure electrical equipment is properly installed and grounded by a qualified electrician, and that it meets and adheres to all local laws and codes.
Be sure covers, guards and safety devices are correctly installed and in proper position.

Danger! Failure to follow proper assembly and operational procedures may cause damage to equipment or personal injury.

1. INTRODUCTION

This Service Manual provides comprehensive technical documentation for all models of UNIQUE-WS split and packaged water source air conditioners.
The information contained in the manual is useful for application engineers, architects, system designers, contractors and various level service and installation personnel.
The manual also contains information about the optional features offered by the UNIQUE-WS series, as well as helpful information on electrical wiring diagrams and refrigeration cycle diagrams for the various models.

Product specifications are subject to change without notice. Appearance of products may differ slightly from manual images.

1.1 Product Overview

Unique-WS air conditioners are operating with water cooled condensing unit and can be utilized in applications such as residential, industrial and commercial buildings, offices, schools and other facilities. The operation of Unique-WS air conditioners is quiet and durable with low maintenance requirements and provides efficient year-round cooling and heating.
The units are suitable for cooling tower installations, ground water sources or open water circuits.

Unique-WS air conditioners feature heat pump facilities for heating, utilizing a 4-way reversing valve which switches the unit into heating mode. In heating mode adequate temperature of the cooling water must be insured.

Alternatively, electric heating elements can be used for heating. In such configuration the units are equipped with additional protection elements.

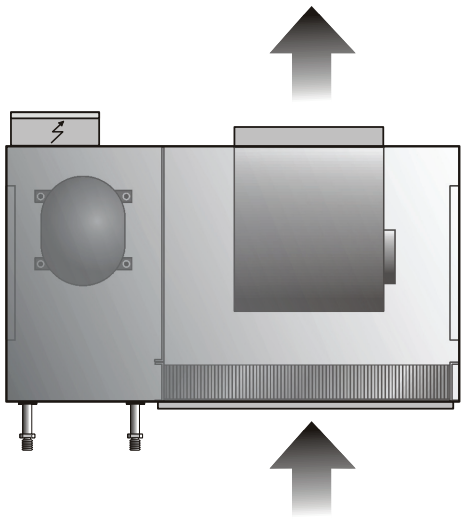
Scope of supply includes package units and split condenser units.

Unique-WS appliances are adequate for ambient temperature range of minimum 19ºC and maximum 35ºC and water input temperature range of minimum 16ºC and maximum 35ºC.

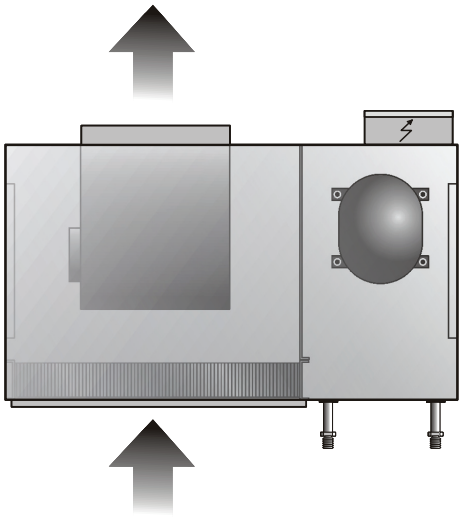
All Unique-WS air conditioners are ISO-9001:2000 and CE certified**.**

1.2 Manufacturing Options

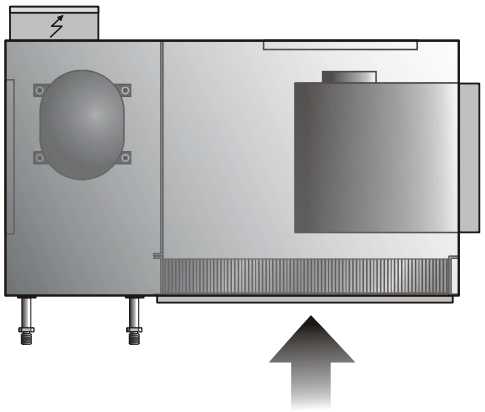
WS air conditioners are available in horizontal or vertical execution. Standard layout includes SL, SR, FL and FR setup. Additional configurations are available upon request.



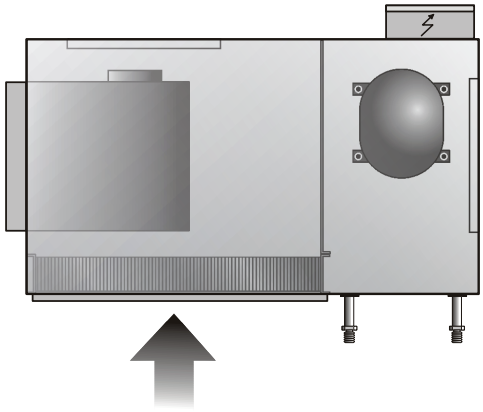
FL



FR



SL



SR

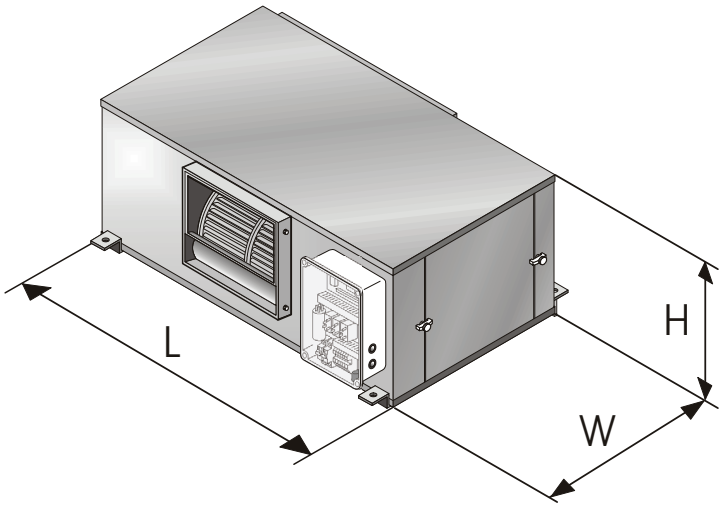
1.3 Nameplate Information

Technical information for a specific unit appears on the unit nameplate, which is attached to the indoor and/or the outdoor units.

The unit nameplate includes the following information:

MODEL	Air-conditioner model name
CLIMATE CLASS	Class T1 – Standard conditions.
VOLT/PHASE/Hz	A/C power supply, for example: 400/3/50 = 400V/3 Phase/50 Hz.
COS φ	Power factor for the unit.
FUSE	Required fuse size, Amp.
CAPACITORS μ F	Compressor capacitor, Fan capacitor (wherever applicable)
AIR FLOW m³/h	Air Flow at High Speed in m³/h
AIR FLOW cfm	Air Flow at High Speed in cfm
WATER FLOW m³/h	Water Flow in m³/h
WATER FLOW gpm	Water Flow in gpm
REFRIGERANT	Type and Quantity of refrigerant charge, Gr.
CAPACITY W	Cooling capacity in Watts.
CAPACITY BTU/H	Cooling capacity in BTU/Hr.
INPUT POWER	Power consumption in cooling and heating modes, watts.
AMP.	Current consumption in cooling and heating modes, Amp.

2.1 Technical Data Table – WS Package Units

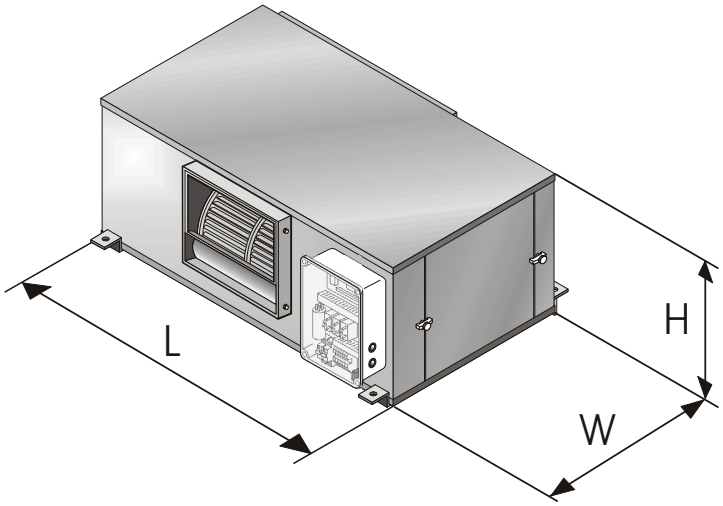


Model			WS-12	WS-15	WS-22	WS-28
Cooling capacity (1)		Watt	3795	4440	6419	8353
		Btu/h	12950	15150	21900	28500
Heating capacity (1)		Watt	5833	6532	9754	10910
		Btu/h	19902	22286	33279	37223
Power Consumption (2)	Cooling	Watt	981	1139	1672	1993
	Heating	Watt	1144	1256	1840	2058
Operating Current (2)	Cooling	Amp.	6	6.5	9.1	10.7
	Heating	Amp.	6	6.4	8.9	10.9
C.O.P	Cooling		3.9	3.9	3.8	4.2
	Heating		4.1	4.2	4.3	4.3
Air Flow		M^3/h	680	850	1190	1530
		CFM	400	500	700	900
Net Static Pressure (3)		mm H_2O	5	5	6	6
Water Flow		M^3/h	1.1	1.2	1.4	1.7
		GPM	4.8	5.3	6.1	7.5
Heat Rejection-Cooling		Watt	4776	5579	8090	10346
		Btu/h	16297	19037	27604	35300
Heat Extraction-Heating		Watt	4689	5276	7913	8851
		Btu/h	16000	18000	27000	30200
Power Supply		V/Ph/Hz	230/1/50 (4)	230/1/50 (4)	230/1/50 (4)	230/1/50 (4)
Time Delay Fuse		Amp.	C10	C10	C16	C16
Water Piping in/out		BSP	3/4"	3/4"	3/4"	1"
Drain		mm	19	19	19	19
Refrigerant Charge		gr.	1020	1300	1900	2400
Dimensions (LxWxH)		mm	880x600x400	880x600x400	880x600x400	960x600x420
Net Weight		Kg.	63	65	75	89

1. Design data for cooling: Air entering temperature 27ºC db/19ºC wb and water inlet temperature 29ºC
   Design data for heating: Air entering temperature 21ºC and water inlet temperature 20ºC
2. Excluding electrical heating element.
3. Net static pressure available at fan discharge at nominal capacity.
4. Available also in 400/3/50.

Data applicable to R407C and may vary up to 3% for R22. For additional information contact Unique ltd.
Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

2.1 Technical Data Table – WS Package Units (continued)



Model			WS-36	WS-43	WS-48	WS-54	WS-61
Cooling capacity (1)		Watt	10551	12749	14068	15826	17878
		Btu/h	36000	43500	48000	54000	61000
Heating capacity (1)		Watt	14269	17087	18893	20720	23740
		Btu/h	48686	58300	64463	70695	81000
Power Consumption (2)	Cooling	Watt	2590	3129	3529	3857	4266
	Heating	Watt	2692	3224	3565	3985	4396
Operating Current (2)	Cooling	Amp	13.5	17	3x7.1	3x7.5	3x7.7
	Heating	Amp	13.9	17.3	3x7.2	3x7.7	3x7.8
C.O.P	Cooling		4.1	4.1	4.0	4.1	4.2
	Heating		4.3	4.3	4.3	4.2	4.4
Air Flow		M^3/h	2040	2550	2720	3060	3400
		CFM	1200	1500	1600	1800	2000
Net Static Pressure (3)		mm H_2O	7	6	6	13	13
Water Flow		M^3/h	2.2	2.6	3.1	3.4	3.6
		GPM	9.6	11.4	13.6	14.9	15.8
Heat Rejection-Cooling		Watt	13141	15879	17597	19684	22144
		Btu/h	44837	54178	60042	67161	75555
Heat Extraction-Heating		Watt	11577	13863	15328	16735	19343
		Btu/h	39500	47300	52300	57100	66000
Power Supply		V/Ph/Hz	230/1/50 (4)	230/1/50 (4)	400/3/50	400/3/50	400/3/50
Time Delay Fuse		Amp.	C20	C25	3xC16	3xC16	3xC16
Water Piping in/out		BSP	1"	1"	1"	1"	1"
Drain		mm	19	19	19	22.2	22.2
Refrigerant Charge		gr.	3000	3800	4100	4500	5200
Dimensions (LxWxH)		mm	1040x600x460	1290x600x520	1290x600x520	1370x700x560	1420x700x560
Net Weight		Kg.	103	110	120	132	140

1. Design data for cooling: Air entering temperature 27ºC db/19ºC wb and water inlet temperature 29ºC
   Design data for heating: Air entering temperature 21ºC and water inlet temperature 20ºC
2. Excluding electrical heating element.
3. Net static pressure available at fan discharge at nominal capacity.
4. Available also in 400/3/50.

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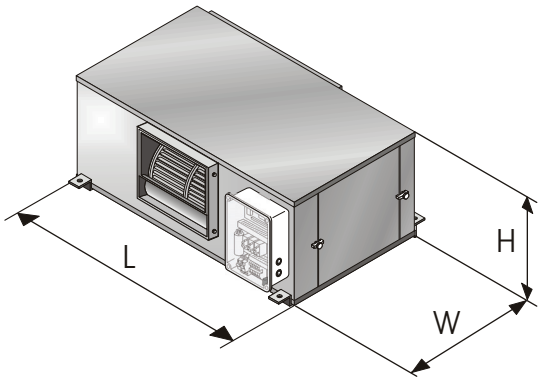
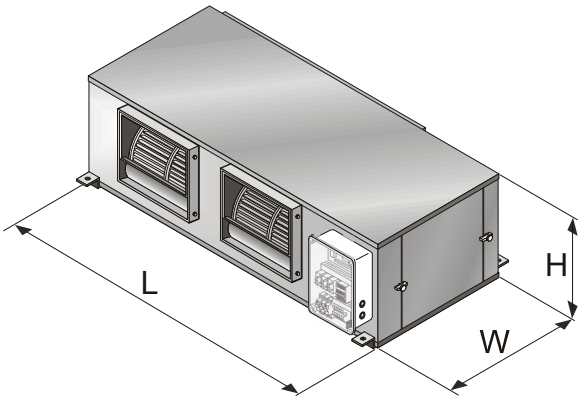
2.1 Technical Data Table – WS Package Units (continued)



WS-75 to WS-102



WS-120 and WS-144

Model			WS-75	WS-85	WS-102	WS-120	WS-144
Cooling capacity (1)		Watt	21981	24912	29894	34402	42292
		Btu/h	75000	85000	102000	120800	144800
Heating capacity (1)		Watt	28344	32187	39339	45830	53394
		Btu/h	96709	109821	134226	156371	174800
Power Consumption (2)	Cooling	Watt	5282	5743	7133	8629	10234
	Heating	Watt	5249	6073	7423	8813	10897
Operating Current (2)	Cooling	Amp	3x10.2	3x13.1	3x17	3x22	3x27
	Heating	Amp	3x10.4	3x13.3	3x17.3	3x22	3x27
C.O.P	Cooling		4.2	4.3	4.2	4.1	4.1
	Heating		4.4	4.3	4.3	4.2	3.9
Air Flow		M^3/h	4250	4760	5440	6800	8160
		CFM	2500	2800	3200	4000	4800
Net Static Pressure (3)		mm H_2O	18	12	14	14	14
Water Flow		M^3/h	4.4	5.2	6.3	7.3	8.5
		GPM	19.3	22.8	27.6	32	37.3
Heat Rejection-Cooling		Watt	27263	30655	37027	44033	52526
		Btu/h	93021	104596	126337	150241	179219
Heat Extraction-Heating		Watt	23095	26144	31917	37016	42497
		Btu/h	78800	89100	108900	126300	145000
Power Supply		V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Time Delay Fuse		Amp.	3xC20	3xC20	3xC25	3xC40	3xC40
Water Piping in/out		BSP	1¼"	1¼"	1¼"	1½"	1½"
Drain		mm	22.2	22.2	22.2	30	30
Refrigerant Charge		gr.	6100	7300	8500	10300	12200
Dimensions (LxWxH)		mm	1510x700x600	1540x750x610	1620x750x610	2050x1000x630	2050x1100x660
Net Weight		Kg.	160	180	190	250	320

1. Design data for cooling: Air entering temperature 27°C db/19°C wb and water inlet temperature 29°C
   Design data for heating: Air entering temperature 21°C and water inlet temperature 20°C
2. Excluding electrical heating element.
3. Net static pressure available at fan discharge at nominal capacity.
4. Available also in 400/3/50.

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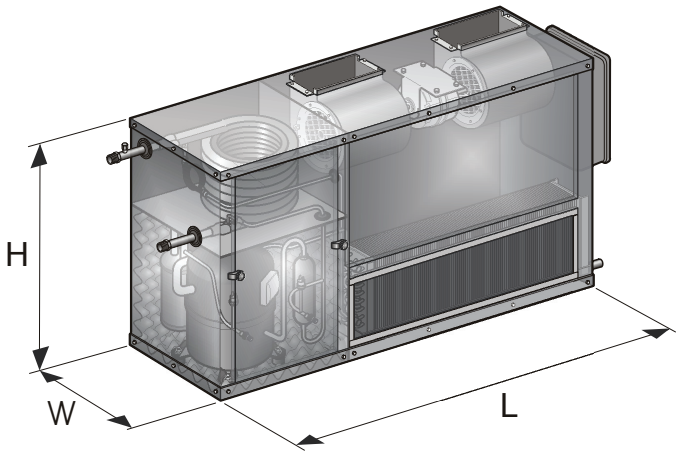
3. Technical data table – WSC – Water Source Console



Model			WSC-12	WSC-15	WSC-22	WSC-28
Cooling capacity (1)		Watt	3795	4440	6419	8353
		Btu/h	12950	15150	21900	28500
Heating capacity (1)		Watt	5833	6532	9754	10910
		Btu/h	19902	22286	33279	37223
Power Consumption (2)	Cooling	Watt	981	1139	1672	1993
	Heating	Watt	1144	1256	1840	2058
Operating Current (2)	Cooling	Amp.	6	6.5	9.1	10.7
	Heating	Amp.	6	6.4	8.9	10.9
C.O.P	Cooling		3.9	3.9	3.8	4.2
	Heating		4.1	4.2	4.3	4.3
Air Flow		M^3/h	680	850	1190	1530
		CFM	400	500	700	900
Net Static Pressure (3)		mm H_2O	5	5	6	6
Water Flow		M^3/h	1.1	1.2	1.4	1.7
		GPM	4.8	5.3	6.1	7.5
Heat Rejection-Cooling		Watt	4776	5579	8090	10346
		Btu/h	16297	19037	27604	35300
Heat Extraction-Heating		Watt	4689	5276	7913	8851
		Btu/h	16000	18000	27000	30200
Power Supply		V/Ph/Hz	230/1/50 (4)	230/1/50 (4)	230/1/50 (4)	230/1/50 (4)
Time Delay Fuse		Amp.	C10	C10	C16	C16
Water Piping in/out		BSP	3/4"	3/4"	3/4"	1"
Drain		mm	19	19	19	19
Refrigerant Charge		gr.	1020	1300	1900	2400
Dimensions (LxWxH)		mm	1100x350x700	1100x350x700	1350x350x700	1350x350x700
Net Weight		Kg.	62	65	75	75

1. Design data for cooling: Air entering temperature 27ºC db/19ºC wb and water inlet temperature 29ºC
   Design data for heating: Air entering temperature 21ºC and water inlet temperature 20ºC
2. Excluding electrical heating element.
3. Net static pressure available at fan discharge at nominal capacity.
4. Available also in 400/3/50.

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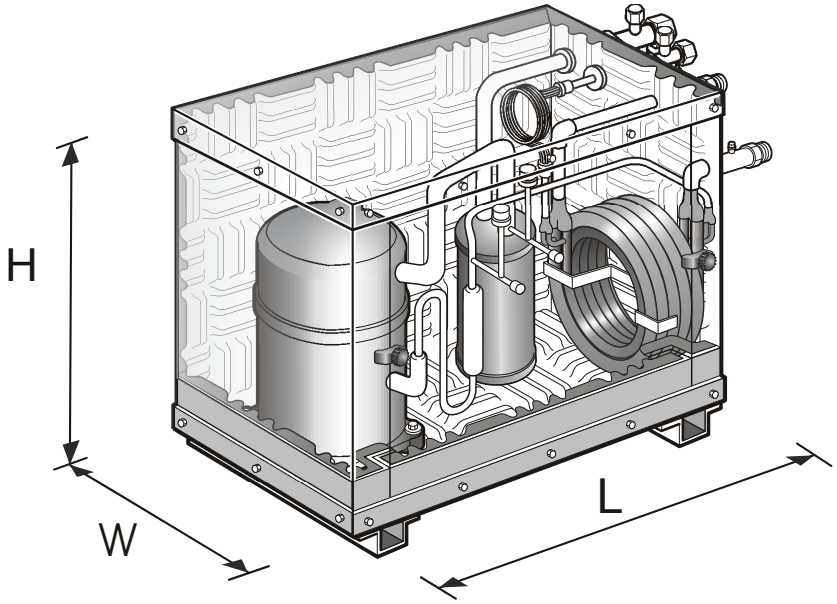
4. Dimensions and Weights – Split Condenser Units



Model	LxWxH	Refrigerant Tubing Connections		Water Inlet	Weight
	mm	Liquid Small inch	Suction Large inch	BSP	Kg
WS-12	600x350x400	3/8"	1/2"	3/4"	35
WS-15	600x350x400	3/8"	1/2"	3/4"	38
WS-22	600x350x400	3/8"	5/8"	3/4"	45
WS-28	600x350x420	3/8"	5/8"	1"	61
WS-36	600x400x460	3/8"	5/8"	1"	68
WS-43	650x450x520	1/2"	3/4"	1"	68
WS-48	650x450x520	1/2"	3/4"	1"	70
WS-54	650x450x520	1/2"	3/4"	1"	71
WS-61	750x480x560	1/2"	7/8"	1"	73
WS-75	750x480x520	1/2"	7/8"	1¼"	75
WS-85	750x550x610	1/2"	7/8"	1¼"	95
WS-102	750x550x610	1/2"	7/8"	1¼"	100
WS-120	850x550x630	5/8"	1⅛"	1½"	135
WS-144	1000x550x660	5/8"	1⅛"	1½"	150

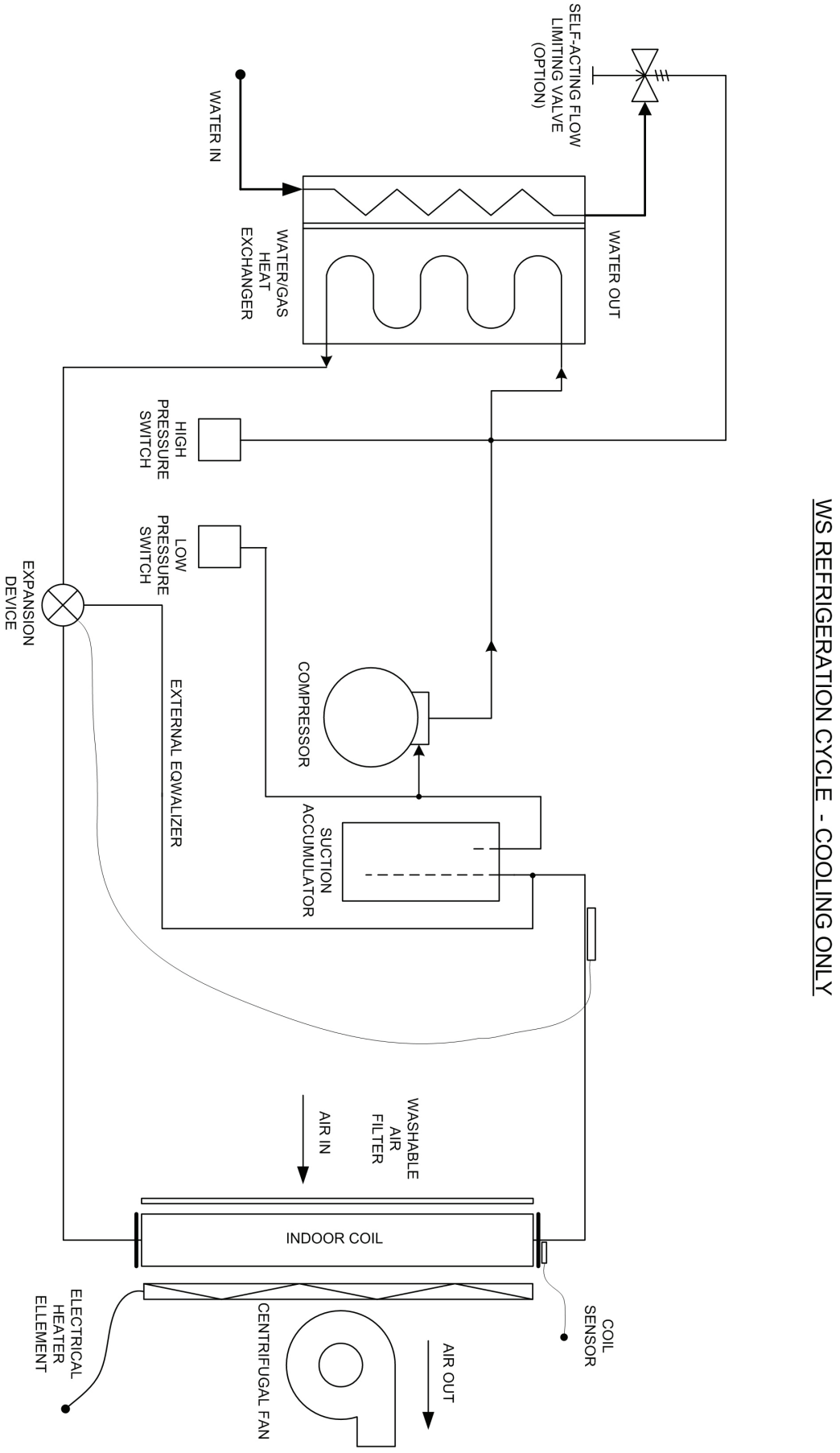
Data applicable to R407C and may vary up to 3% for R22. For additional information contact Unique ltd.
Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

5. Heating Element Recommendations

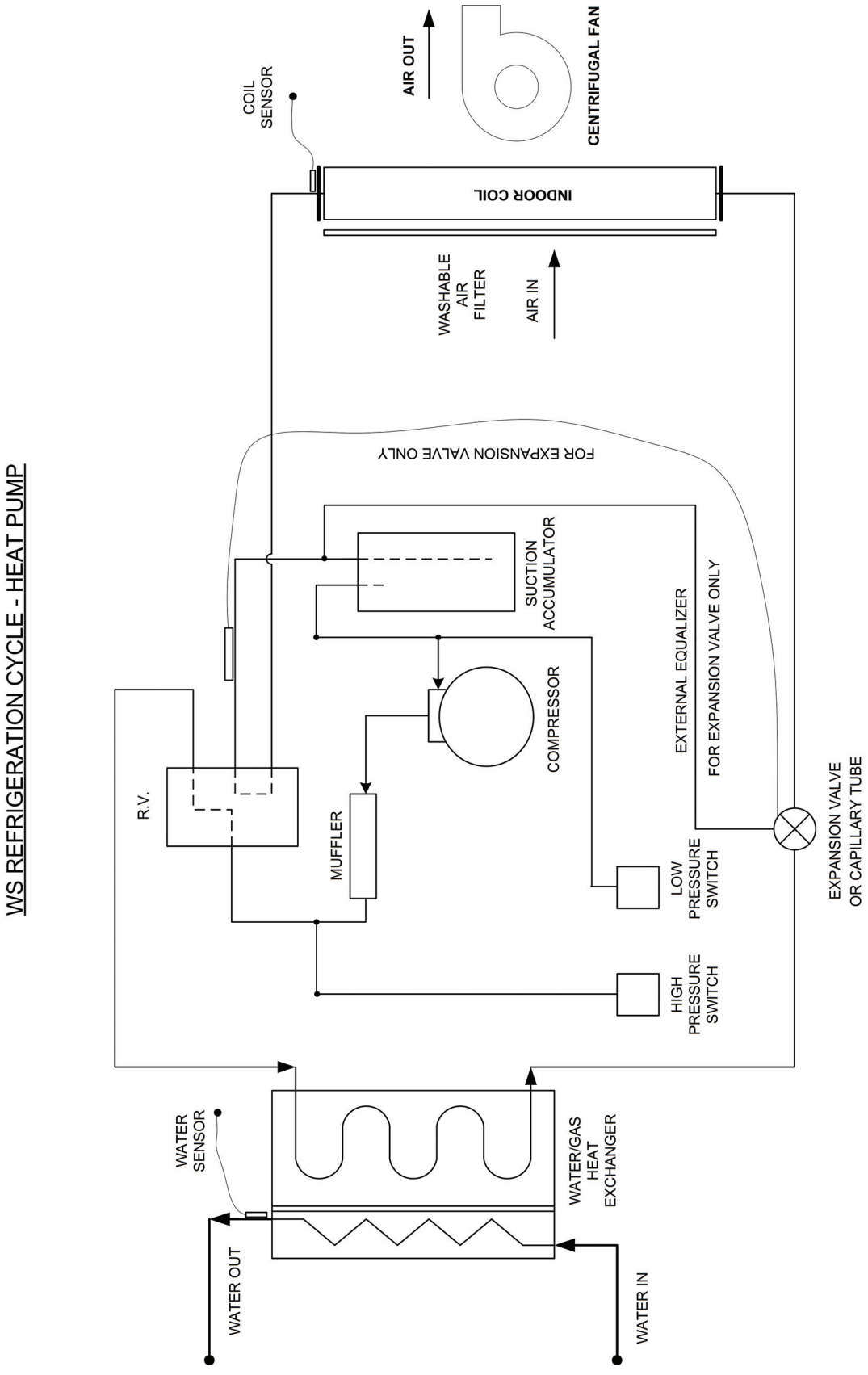
Model	Heating Element Kw	1-Ph Units		3-Ph Units	
		Current Amp.	Fuse Amp.	Current Amp.	Fuse Amp.
WS-12	1.5	6.8	10	3x2.2	3x6
WS-15	2	9.1	10	3x3.1	3x6
WS-22	3	13.7	16	3x4.6	3x6
WS-28	4	18.2	20	3x6.1	3x10
WS-36	5	22.8	25	3x7.6	3x10
WS-43	6	27.3	32	3x9.1	3x16
WS-48	6	-	-	3x9.1	3x16
WS-54	8	-	-	3x12.2	3x16
WS-61	9	-	-	3x13.7	3x16
WS-75	9	-	-	3x13.7	3x16
WS-85	10	-	-	3x15.2	3x20
WS-102	12	-	-	3x18.2	3x20
WS-120	14	-	-	3x20.3	3x25
WS-144	17	-	-	3x26	3x32

Data applicable to R407C and may vary up to 3% for R22. For additional information contact Unique ltd.
Product specifications are subject to change without notice. Appearance of products may differ slightly from catalog.

6.1 Refrigeration Cycle – Cooling Only



6.2 Refrigeration Cycle – Heat Pump



7. INSTALATION INSTRUCTIONS

7.1 General

All parts and accessories are packed and shipped with appropriate measure to ensure that everything is protected during transportation.
The installation team must be familiar with the installation requirements, to exercise due care in handling and to prevent damage to the equipment.
The following instructions are in addition to any state and municipal regulations which may apply. These instructions do not cover all features concerning HVAC installation or methods of procedure.
The appliance shall be installed in accordance with the national wiring regulations.
The installation must be performed in accordance with manufacturer's specifications using only approved piping, original cables and original accessories.

Note: The appliance is classified as a stationary class I motor-operated appliance.

7.2 Electrical Requirements

- The appliance is stationary and shall be connected to the electrical supply by fixed wiring.
- The air conditioner must be directly connected to an appropriate power supply.
- Use only fuses as specified in the data tables.
- Use only a single length power cable, without extensions.
- If the supply cord is damaged, it must be replaced by a qualified electrician and in accordance with national wiring regulations.
- Cable and conduit entries shall be suitable for cables or conduits having maximum overall diameters of 14 mm and 16 mm (23 mm in USA and Canada), respectively. Introduction of conduit or cable does not reduce clearances below 2 mm for basic supplementary insulation and 2 mm for functional insulation.
- Supply cord shall not be lighter than each of the following (a lower number in the code designation of the cord in IEC 60227 or IEC 60245 indicates a lighter type):
  a. Ordinary tough rubber sheathed cord (code designation 60245 IEC 53)
  b. Light polyvinyl chloride sheathed cord (code designation 60227 IEC 53)
- Nominal cross-sectional area for conductors of supply cord (cable for fixed wiring) shall be 2.5-6 mm².
- Supply cord shall not be in contact with sharp points or edges of the appliance.
- The supply cord shall have a green/yellow core that is connected to the earthing terminal of the appliance and to the earth contact of the outlet.
- Conductors of supply cords shall not be consolidated by lead-tin soldering where they are subjected to contact pressure, unless the clamping means is constructed so that there is no risk of bad contact due to cold flow of the solder.
- Mounting the cord to part of the enclosure shall not damage the insulation of the supply cord.
- Chord anchorages shall be arranged so that they are only accessible with the aid of a tool or shall be constructed so that the cord can only be fitted with the aid of a tool.
- The insulated conductors of the supply cord shall be additionally insulated from accessible metal parts by basic insulation. This insulation may be provided by the sheath of the supply cord or by other means.

- The arrangement of the terminals, or the length of the conductors between the cord anchorage and the terminals, shall be such that the current carrying conductors become taut before the earth conductor if the cord slips out of the cord anchorage.
- Conditional connection to power network provides not more than 0.09 ohm of power system impedance.

Important! Means for disconnecting from the supply mains, having a contact separation in all poles that provide full disconnection under overvoltage category III, shall be incorporated in the fixed wiring and directly connected to the supply terminals, in accordance with the wiring rules.

Important! Means for disconnection from supply mains must be incorporated in the fixed wiring in accordance with the national wiring regulations.

Important! The control wires between the main control box and the wall mounted thermostat utilize low voltage 12V DC.
The supply (mains) cable and control wire (flat cable between the wall mounted thermostat Alfa 261 and electrical box) shall be passed in separate (different) ducts and not in proximity to each other.

Note: Main circuit breaker and power supply must always be ON in models that their compressor is equipped with oil heating element.
If disconnected, make sure that power supply was ON for at least 6 hours before starting the unit.

Note: The appliance is suitable for indoor use only.

Warning! Failure to comply with these instructions may cause malfunction of the unit.

Important! In case where an electrical valve for entering or exiting cooling water is being used - verify that valve is open before the compressor starts.

7.3 Typical WS Installation

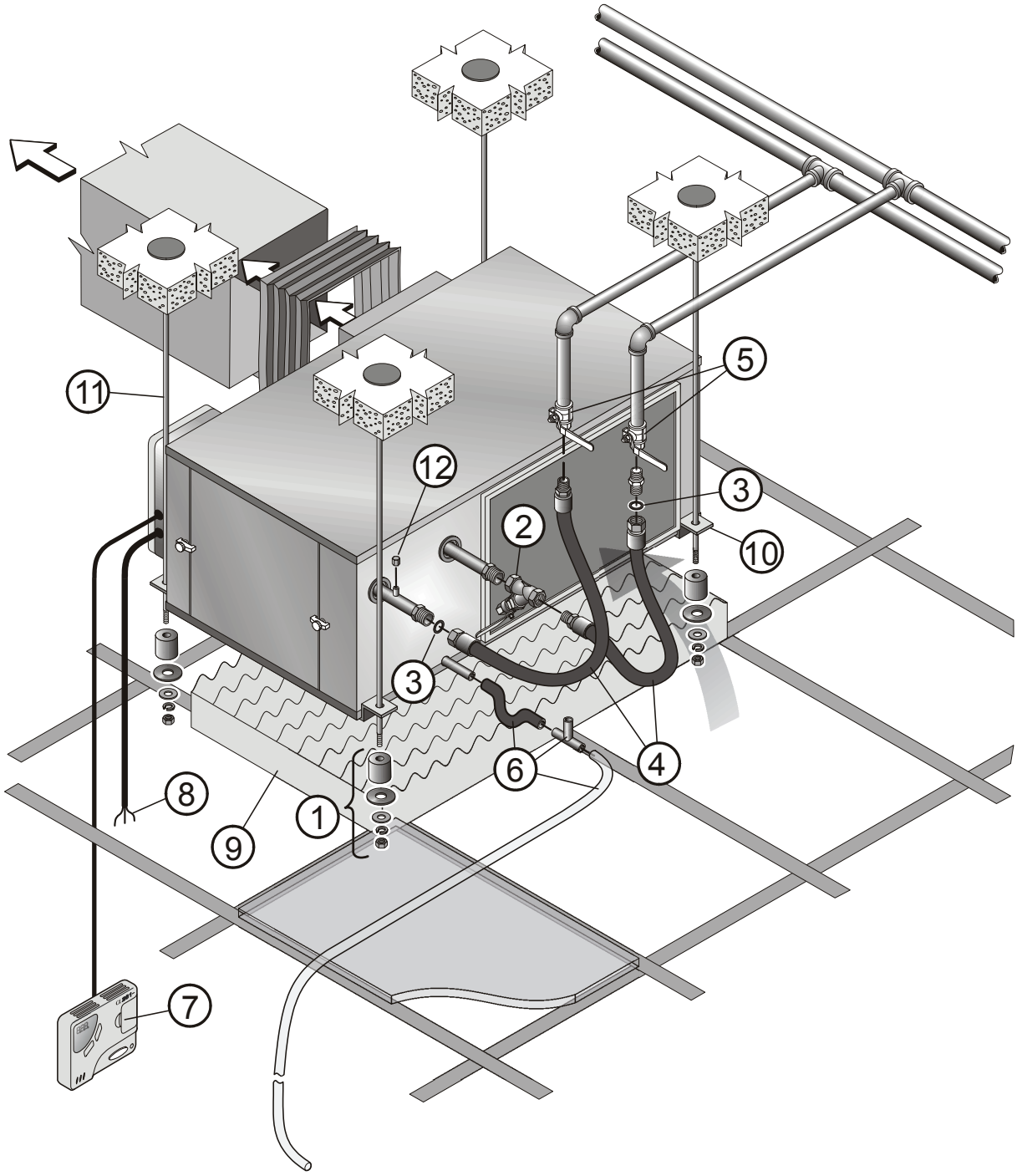


Fig. 7-1

1. Rubber Shock Absorbers.
2. Strainer.
3. PTFE or Rubber ring.
4. Flexible hose.
5. Cut-Off Valves.
6. Rubber Joints (Siphon, T-Connection and Drain Hose).
7. Control Unit.
8. Electrical cable.
9. Acoustic Insulation.
10. Hanger Mounting Brackets.
11. Hanger Anchors.
12. Air Vent Plug.

7.4 Unit Location and Installation

- Install the unit in a location with convenient access to the service panels, air filter and control box. See Fig. 7-2 for minimum permissible distances to adjacent structures.
- Protect the unit from any heat source.
- Make sure that the unit is level.
- For all models, hanging installation is commonly used. Installing the unit resting on a rigid surface is allowed.
- Carefully plan the drainage hose path at a minimum slope of 2%, avoiding sharp bends or water traps.

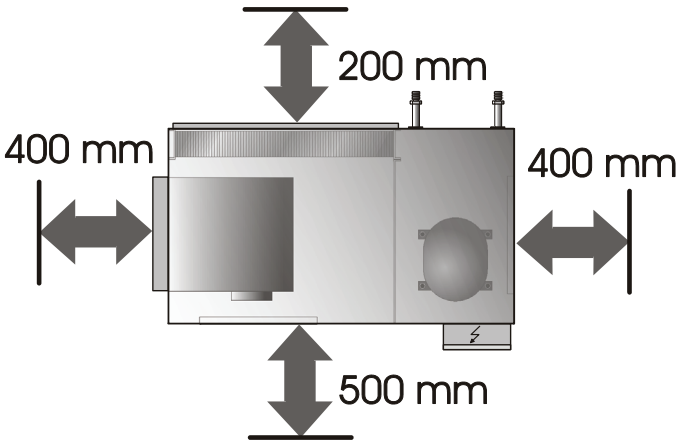


Fig. 7-2

7.4.1 Installing the Unit Directly On the Ceiling (Fig. 7-1)

- Select the installation location according to the above mentioned considerations and guidelines.
- Mark 4 holes on the ceiling, according to the unit's mounting bracket holes (10).
- Drill adequate holes and fix the long ceiling anchors (11) in position.
- Lift up the unit onto the hanger anchors through the mounting brackets. Insert four rubber shock absorbers on the four anchors, as shown in Fig. 7-1. Lock the assembly with the lock nut.
- Should the unit be installed on a rigid surface, stick four rubber absorbtion cushions on the four corners of the base.
- In any mode of installation it is recommended to place under the unit an acoustic insulation sheet (9).

7.5 Connecting the Water Piping

- Clearly identify the water supply piping.
- An external safeguard device shall be connected to the water source to limit its output pressure (in excess of atmospheric pressure) to 6 bar.
- Use flexible hoses (4) to connect the water piping according to Fig. 7-3. For piping size see technical data tables. Use only premium quality flexible hoses and make sure it withstands the system water pressure. (Note: Ample pressure hoses must be installed in tall buildings.)

- Connect the incoming water to the WATER IN connection and the return water to the WATER OUT connection. Use adequate thread sealant and also the supplied sealing ring (3).
- The supplied strainer (2) must be installed on the WATER IN connection. See Fig. 7-1. Install the strainer with the drain plug facing down, in a location with convenient service access.
- Complete the water piping installation and open the two cut-off valves (5). Allow water to flow in and out the unit.
- Carefully open the air vent plug (12). Release all air from the system and close the plug back.
- Inspect all connections for water leaks. It is common practice to leave open the two cut-off valves (5) throughout the rest of the installation and occasionally inspect the piping for leaks.

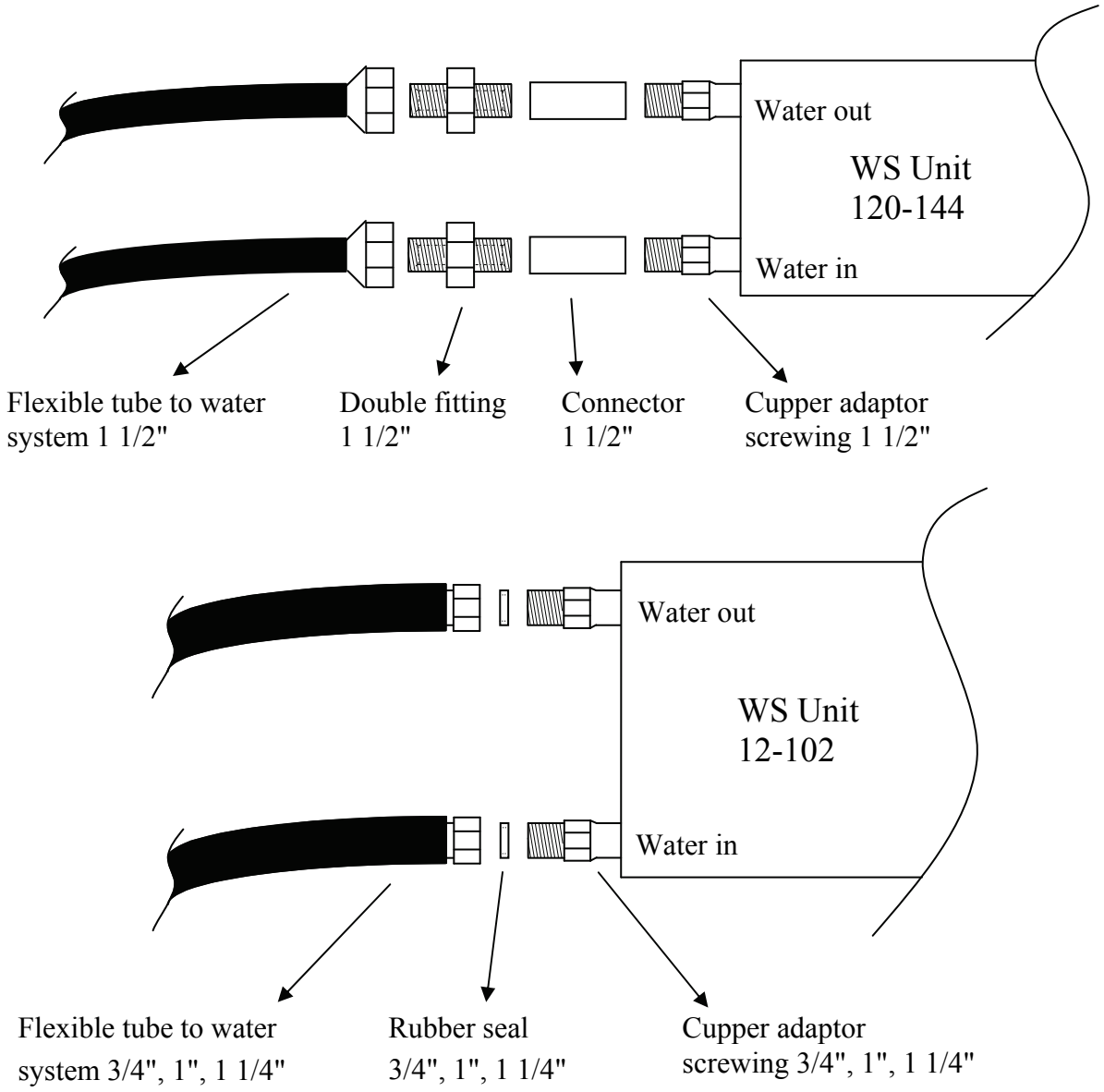


Fig. 7-3

7.6 Connecting the Drain Hose

Connect the supplied rubber siphon (6) to the drain hose connection. See Fig. 7-1 for details. The T- connection (breather, not supplied) and the drain hose (not supplied) immediately follow the siphon.

7.7 Connecting the Ducting Work

- To obtain optimal results, duct cross sections, connections, elbows and branches must be properly designed. We highly recommend seeking for expert advice on this matter.
- Use flexible sleeve to connect the ducting to the air conditioner.

7.8 Connecting the Temperature Sensor Bulbs

- See Fig. 7-4 for identification.
- The temperature sensor bulbs are factory pre-assembled.
- In case of replacement, make sure that the new bulb is fitted into the locating tube with touch-fit.

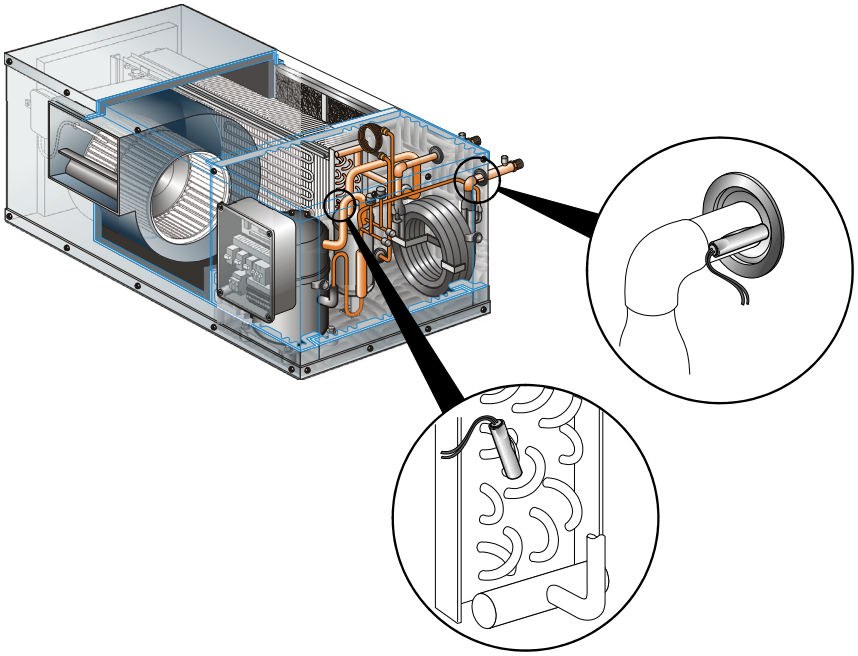


Fig. 7-4

8. INSTALLING CONTROL SYSTEM and CONNECTING POWER

8.1 Installing the Thermostat (Fig. 8-1)

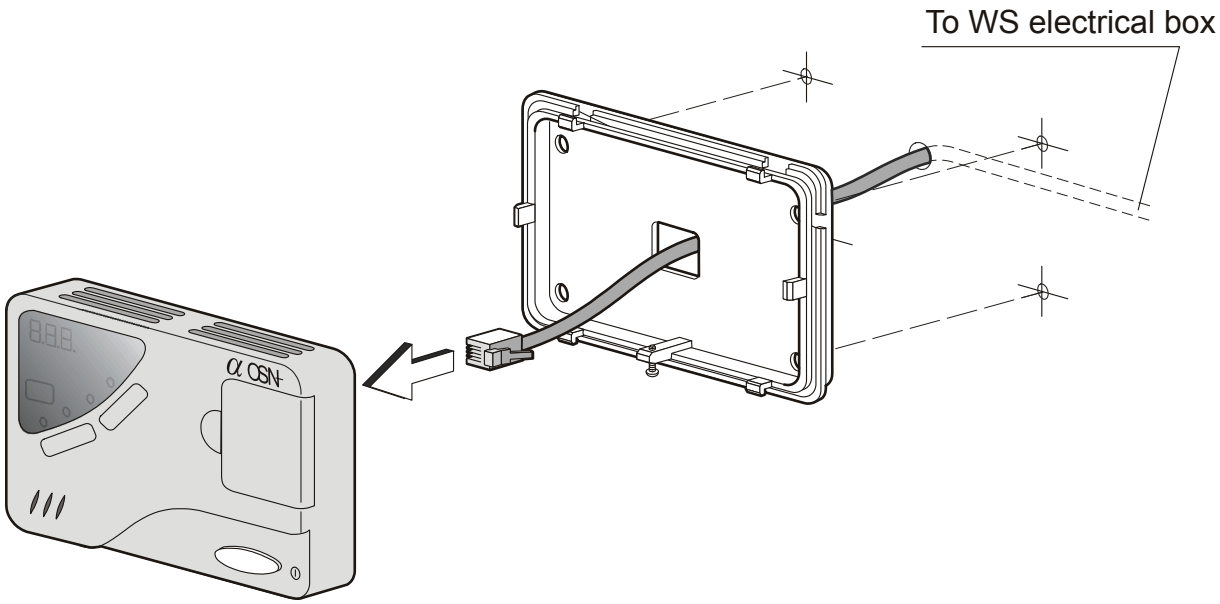


Fig. 8-1

- Remove the thermostat from the packaging.
- Install the in-room wall mounted thermostat:
  - Separate the front panel from the back panel by depressing the tongue lock located in the back part of the unit.
  - Push the back panel out.
  - Gently disconnect the data cable from its quick connect wiring harness.
  - Line the back panel up against the wall or against any other flat surface onto which it is to be mounted. Drill holes and use appropriate fixing screws to fasten the panel to its location.
- Locate the terminal box. See Fig. 8-2 and Fig. 8-3.
- Complete the electrical connections according to the electrical wiring diagrams.
- Reconnect the data cable and close back the cover of the thermostat to its base.

8.2 Terminal Box Location – Single Phase Unit

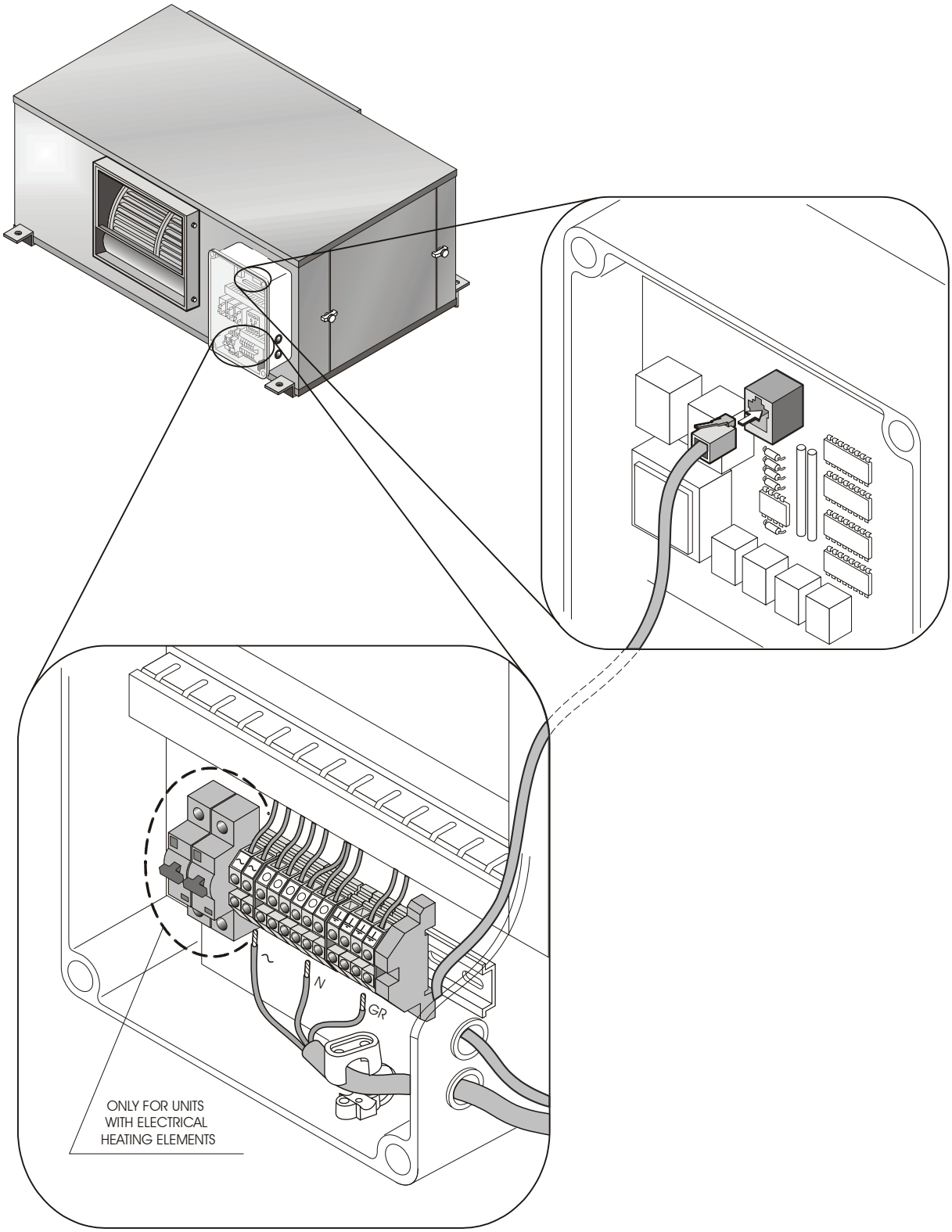


Fig. 8-2

8.3 Terminal Box Location – 3 Phase Unit

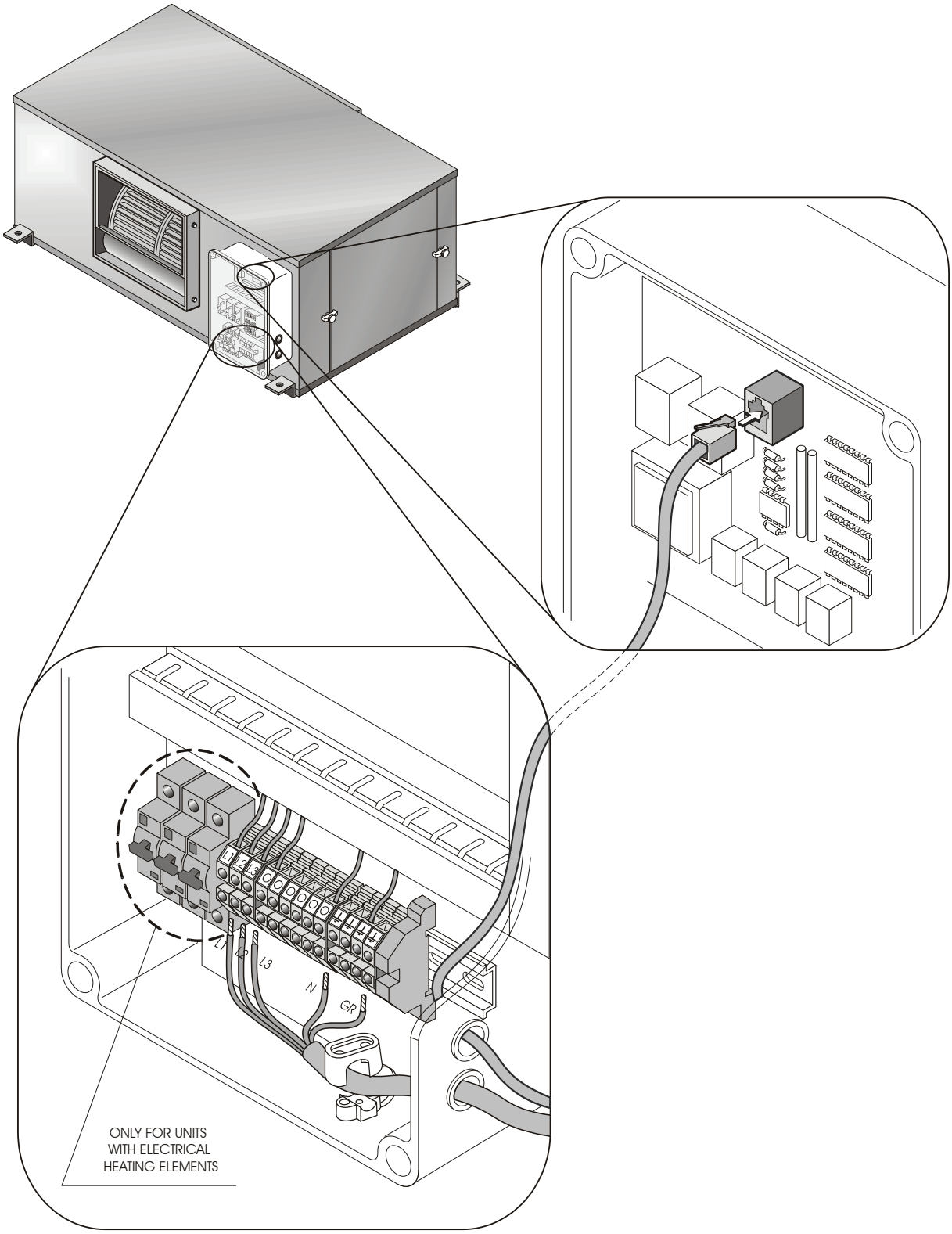
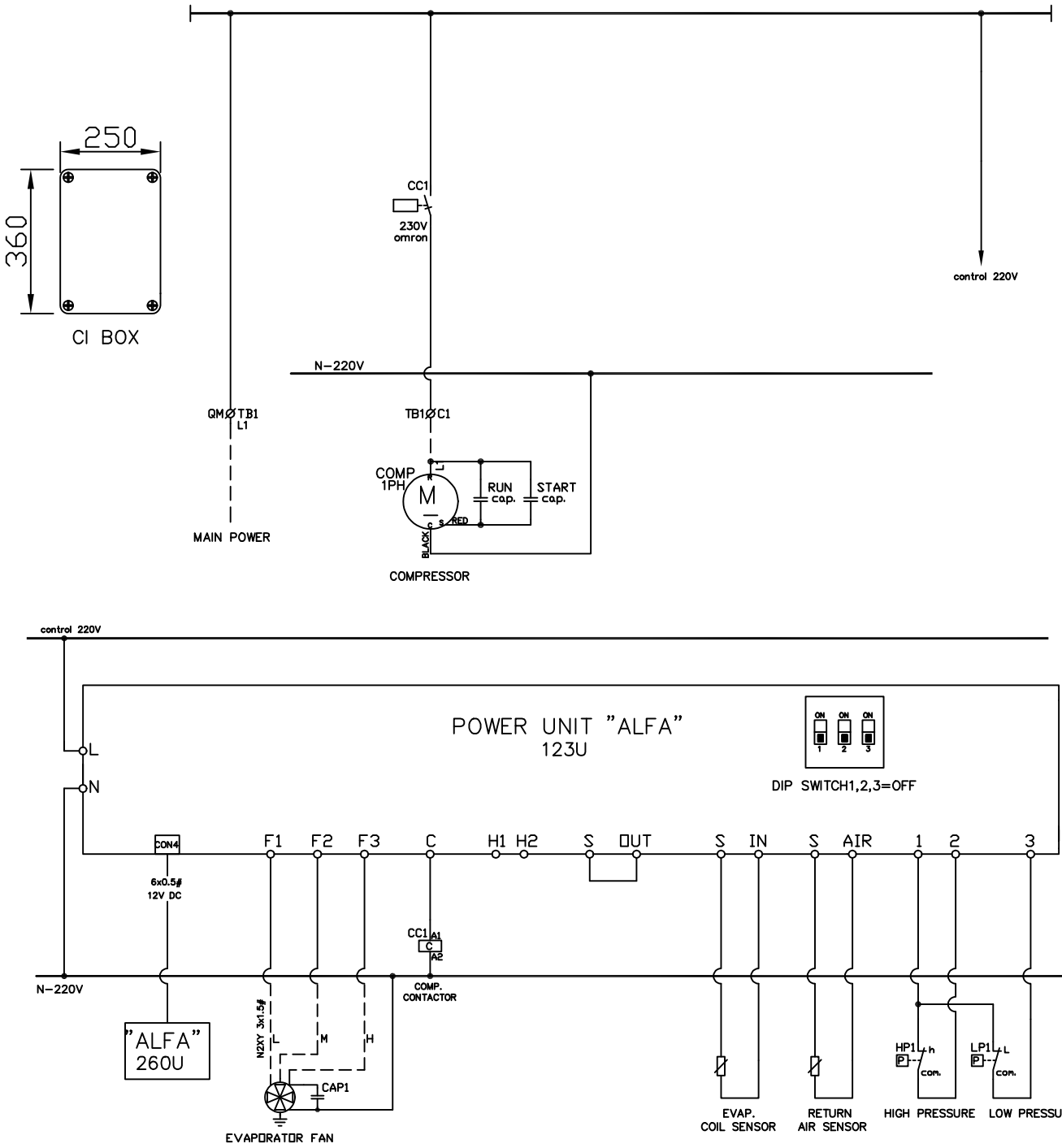


Fig. 8-3

9. Electrical Wiring Diagrams

9.1 Electrical Wiring Diagram – Single Phase Cooling Only – Model 260U

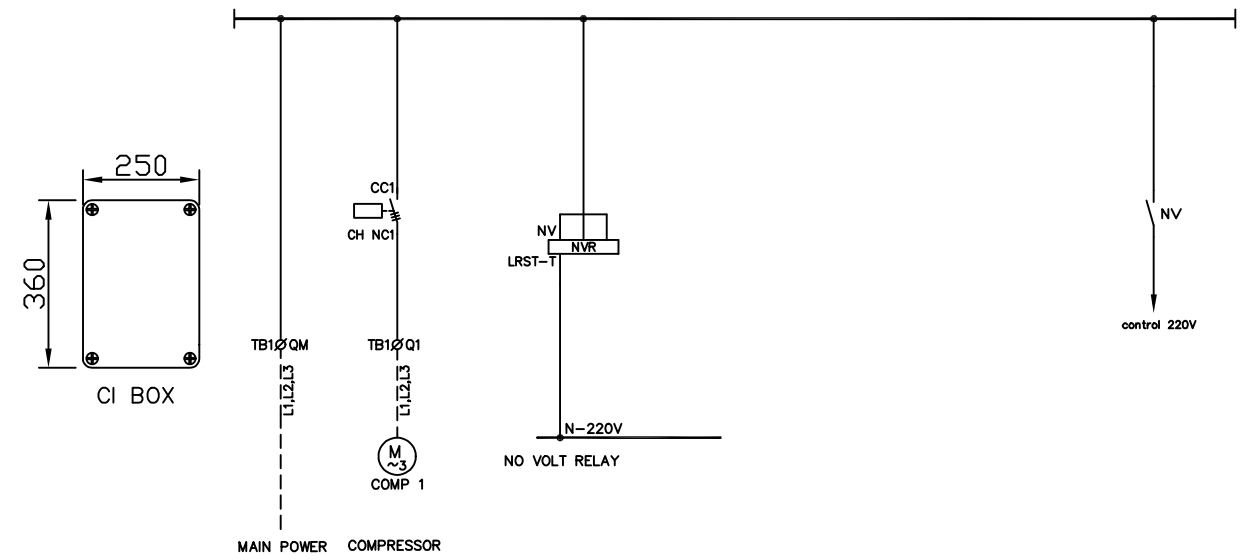


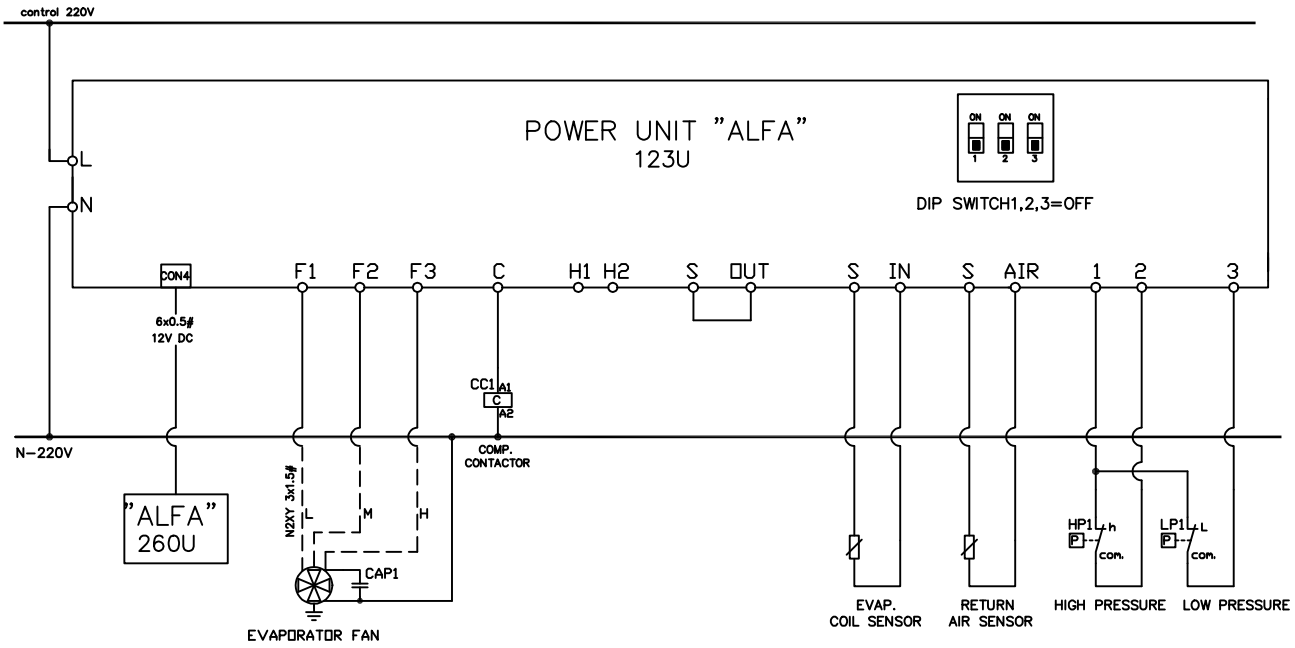
HP – High pressure control
LP – Low pressure control
CC – Compressor contactor

ALFA 123U – Power switch unit
ALFA 260U – Room Thermostat

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm²	2.5	2.5	2.5	4	4	6	-	-	-	-	-	-	-	-

9.2 Electrical Wiring Diagram – 3 Phase Cooling Only – Model 260U



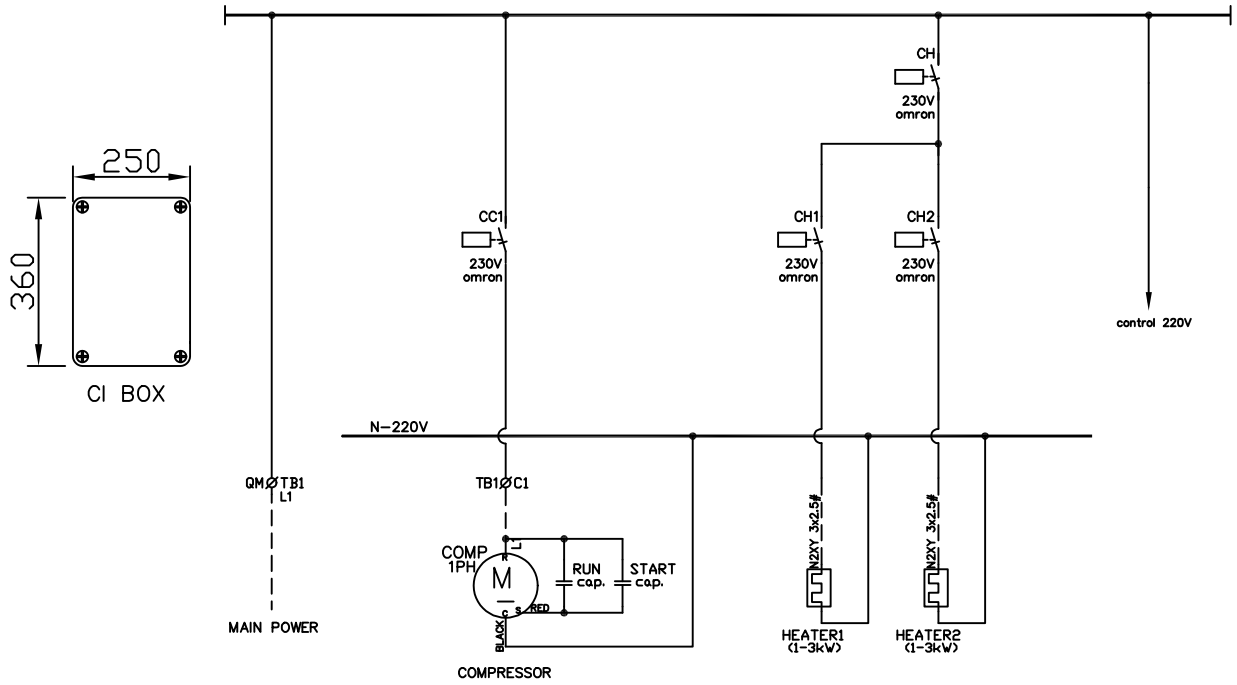


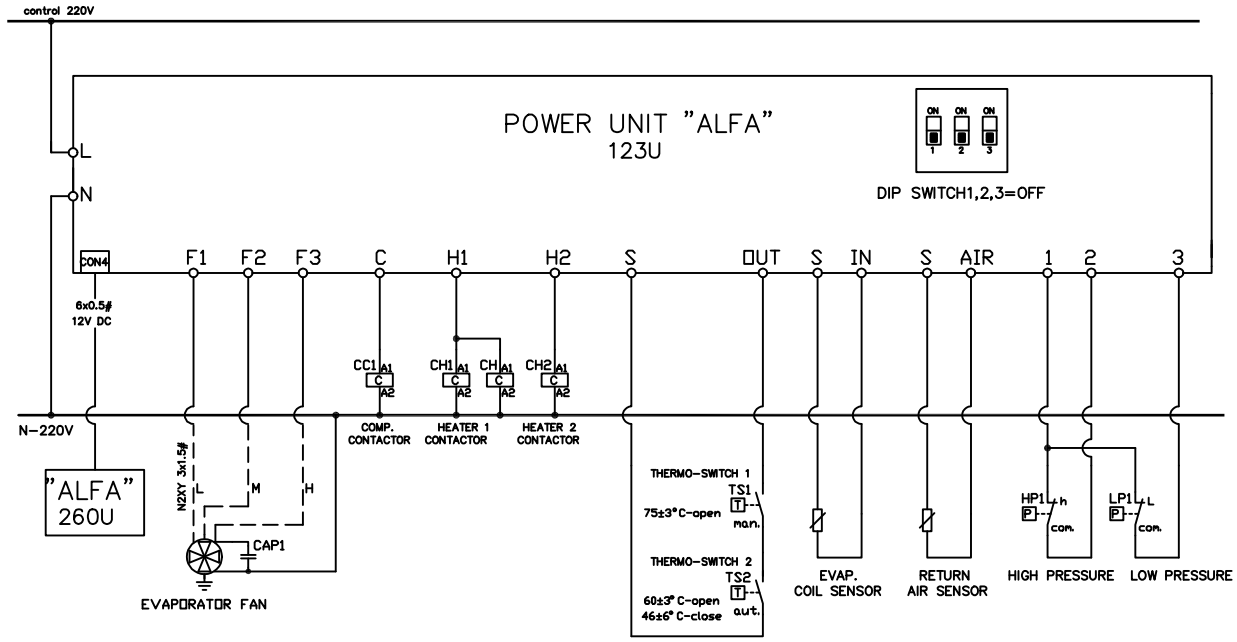
HP – High pressure control
LP – Low pressure control
CC – Compressor contactor

ALFA 123U – Power switch unit
ALFA 260U – Room Thermostat

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm²	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4	4	6	10	10

9.3 Electrical Wiring Diagram – Single Phase with Electrical Heating Elements – Model 260U



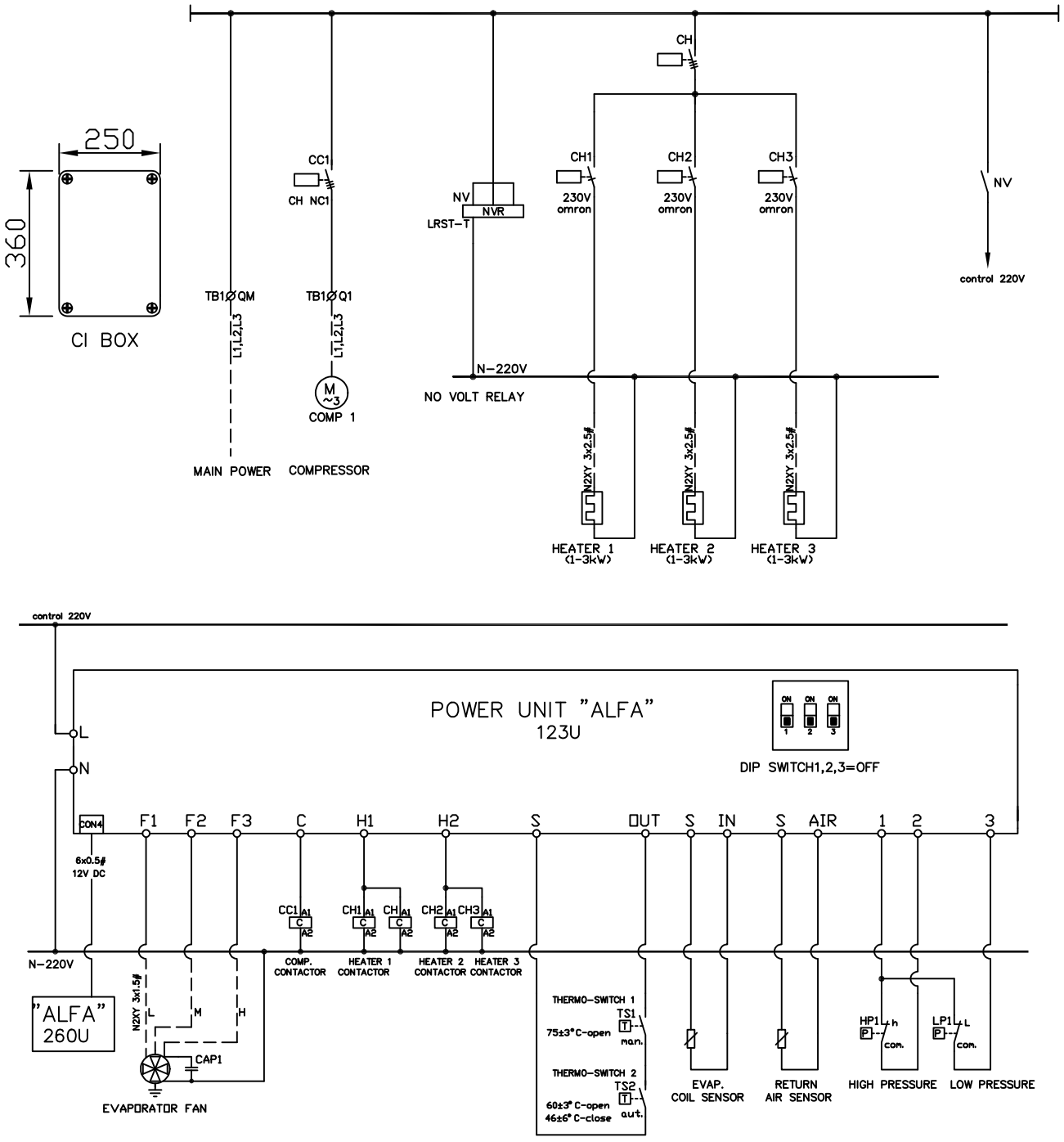


HP – High pressure control
LP – Low pressure control
ALFA 260U – Room Thermostat
ALFA 123U – Power switch unit

CC – Compressor contactor
CH1, CH2 – Heaters contactor
TS1, TS2 – Safety thermostat

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm²	2.5	2.5	2.5	4	4	6	-	-	-	-	-	-	-	-

9.4 Electrical Wiring Diagram – 3 Phase with Electrical Heating Elements – Model 260U

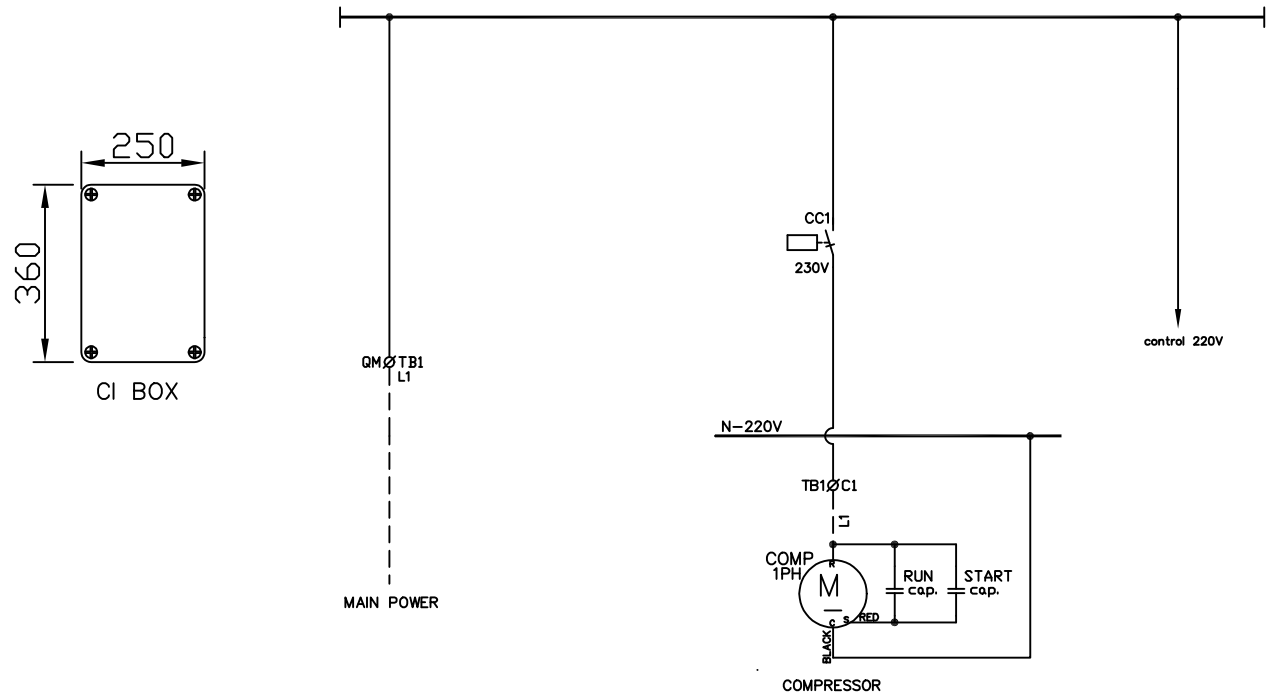


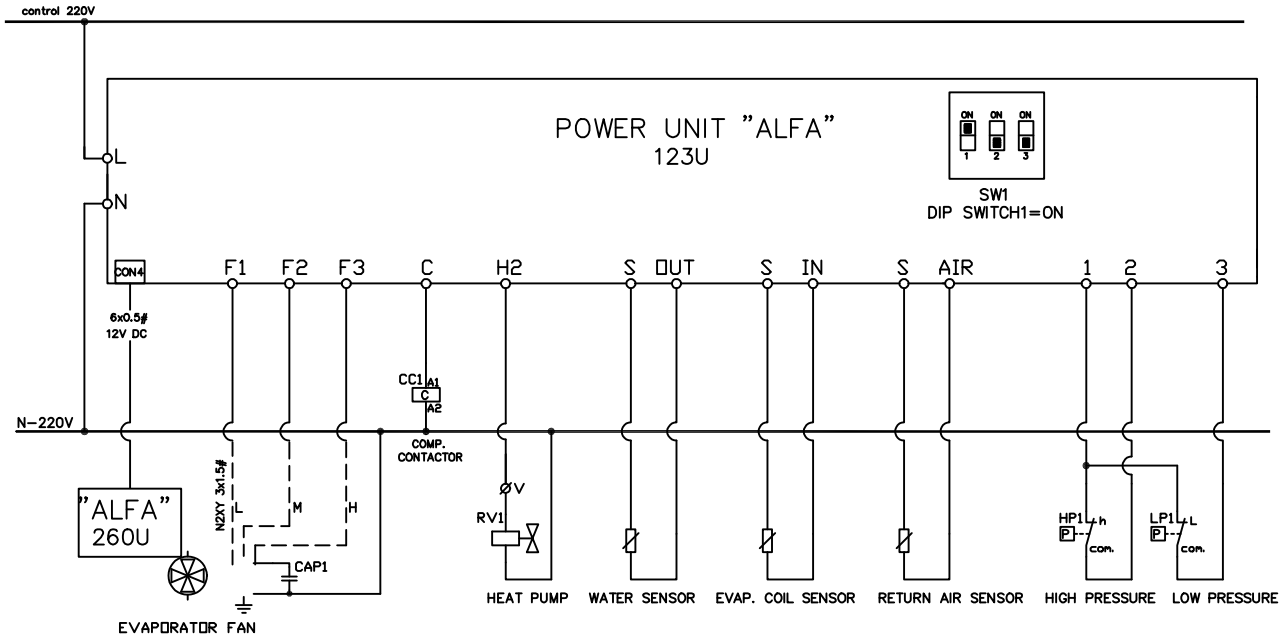
HP – High pressure control
LP – Low pressure control
ALFA 260U – Room Thermostat
ALFA 123U – Power switch unit

CC – Compressor contactor
CH1, CH2 – Heaters contactor
TS1, TS2 – Safety thermostat

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm²	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4	4	6	10	10

9.5 Electrical Wiring Diagram – Single Phase with Heat Pump – Model 260U

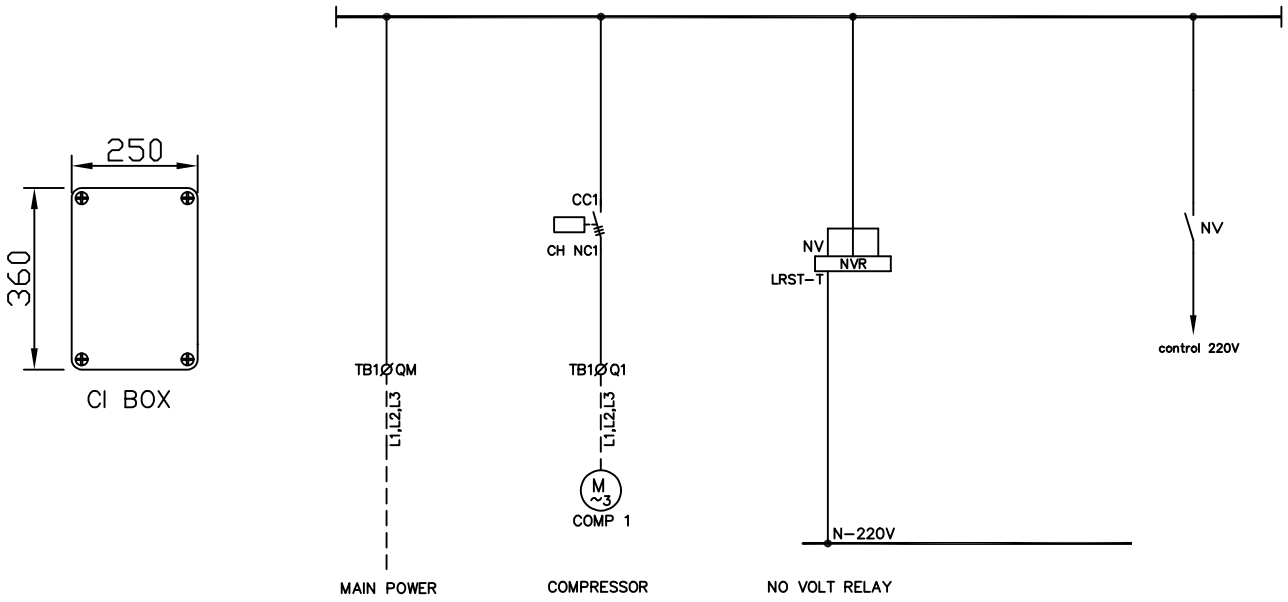


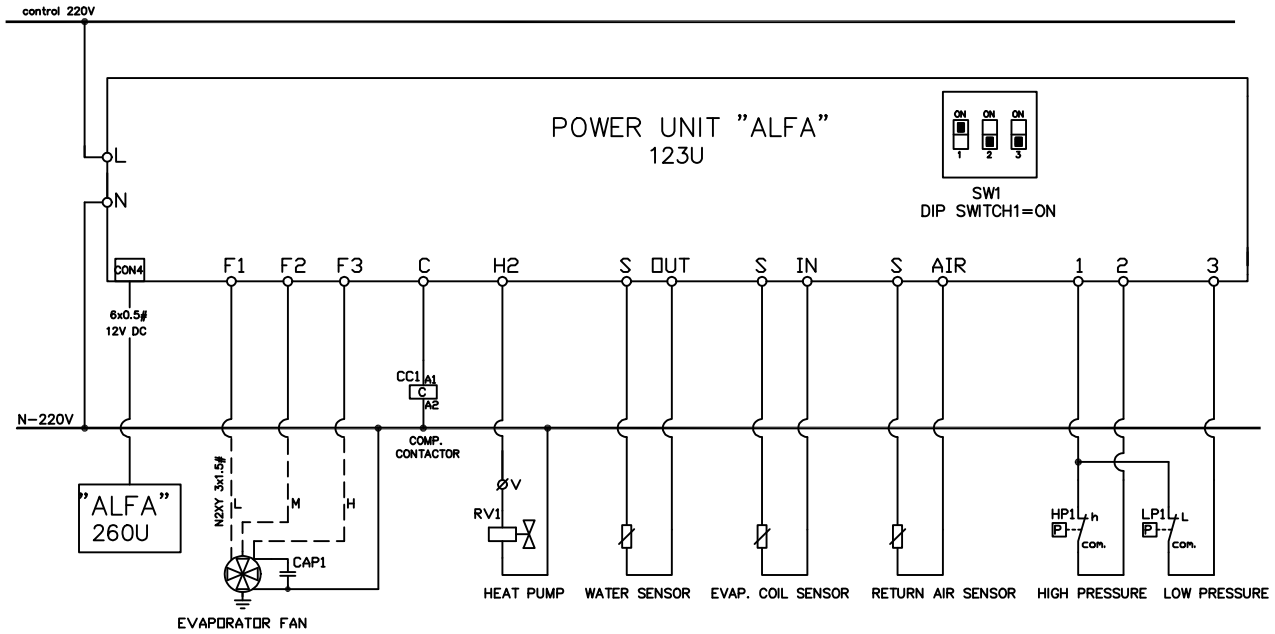


HP – High pressure control
LP – Low pressure control
ALFA 260U – Room Thermostat
ALFA 123U – Power switch unit
CC – Compressor contactor
RV1 – 4 way valve

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm²	2.5	2.5	2.5	4	4	6	-	-	-	-	-	-	-	-

9.6 Electrical Wiring Diagram – 3 Phase With Heat Pump – Model 260U





HP – High pressure control
LP – Low pressure control
ALFA 260U – Room Thermostat
ALFA 123U – Power switch unit
CC – Compressor contactor
RV1 – 4 way valve

WS Type	12	15	22	28	36	43	48	54	61	75	85	102	120	144
MAIN POWER Cable Cross Section Area mm²	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4	4	6	10	10

10. TROUBLESHOOTING GUIDE

10.1 Troubleshooting Notes.

Important! Reset: Once the unit has stopped due to failure, restart is possible after resetting. Reset the system by pressing ON/OFF button on the room thermostat. Call the technician for assistance should the failure be repeated.

Note: Check for broken wires and loose cable lugs first!

Warning: Always unplug the A/C before performing cleaning or maintenance activities.

10.2 Failure Code Troubleshooting.

	Display	Possible Cause	Corrective Action
1	**ER2** Return Air Sensor failure. Unit continues running.	Short, disconnected or faulty return air sensor.	Check return air sensor. Replace sensor if faulty.
2	**ER3** Evaporator coil sensor failure. Unit continues running.	Short, disconnected or faulty evaporator coil sensor.	Check evaporator coil sensor. Replace sensor if faulty.
3	**ER4** **Only for Heat Pump** Water temperature sensor failure Unit continues running.	Short, disconnected or faulty water temperature sensor.	Check water temperature sensor. Replace sensor if faulty.

Failure Code Troubleshooting (continued).

	Display	Possible Cause	Corrective Action
4	**ER5** Gas pressure too low	1. Clogged air filter 2. Faulty fan capacitor. 3. Faulty fan motor. 4. Air discharge shutters are too closed. 5. Lack of refrigerant. 6. Condenser cooling water is too cold.	1. Clean filter. 2. Replace capacitor. 3. Replace fan motor. 4. Open air discharge shutters. 5. Check for leaks and add refrigerant. 6. Check cooling tower (or the cooling water source) for proper operation.
5	**ER6** Gas pressure too high	1. Clogged water strainer. 2. Condenser cooling water too warm. 3. No water circulation in heat exchanger.	1. Clean strainer. 2. Check cooling tower (or the cooling water source) for proper operation. 3. a. Check cooling tower (or the cooling water source) for proper operation. b. Heat exchanger is clogged. Clean the heat exchanger or replace it.
6	**ER7** **Only for units with electrical heating elements.** Heating elements protection.	1. No air supply at indoor side. 2. Indoor fan is not running. 3. Air shutters are closed.	1. See troubleshooting guide section 10.3 item 4 2. See troubleshooting guide section 10.3 item 7 3. Open air shutters.
7	**ER8** **Only for Heat Pump** Water temperature too cold.	1. Lack of water or low water flow.	1. Check water filter.

10.3 General Troubleshooting.

	Symptom	Probable Cause	Corrective Action
1	A/C fails to start.	1. Power supply to unit not connected (display is blank). 2. Fuse Blown (display is blank). 3. Electric supply wall socket is defective.	1. Check for proper connection of power plugs in wall socket. Check red LED on RST Controller (wherever applicable): If LED is OFF – change RST wires. If LED is ON – check Phase voltage. 2. Reset automatic circuit breaker or replace line fuse. 3. Repair or replace wall socket.
2	Only indoor fan motor works although cooling or heating is desired.	1. The selected mode is on Fan Only, or on Cool when heating is desired. 2. Temperature is set to a value which is too high (in Cool mode). 3. Faulty compressor.	1. Check if the room thermostat is on the desired mode. If not, select the correct mode (refer to your User Manual). 2. Observe the temperature setting on the room thermostat. 3. Replace compressor.
3	Only fan motor is working. No cooling and/or heating take place.	1. Overload safety device on compressor is cut out due to high temperature. 2. Compressor run capacitor is burnt. 3. Compressor winding shorted.	1. Switch Off power and try again after one hour. 2. Replace compressor run capacitor. 3. Replace compressor.
4	No air supply at indoor unit	1. Indoor fan motor is blocked or turns slowly. 2. Indoor fan motor capacitor is burnt. 3. Indoor fan motor winding is burnt. 4. Clogged air filters.	1. Check voltage. Repair wiring if necessary. Check indoor fan wheel if tight on motor shaft. Tighten if necessary. 2. Replace indoor fan motor capacitor. 3. Replace indoor fan motor. 4. Clean filters.

General Troubleshooting (continued).

	Symptom	Probable Cause	Corrective Action
5	Low Capacity.	1. Lack of refrigerant causes ice formation on the evaporator coil (in Cool mode). 2. Clogged air filters.	1. Unit must be charged (according to the nameplate) after localizing the gas leak. 2. Clean filters.
6	Water accumulates and overflows from evaporator drain pan.	Drain pan pipe or hose is clogged or the spout of drain pan is clogged.	Disassemble plastic drain-pipe from spout of evaporator drain pan. Flush with clean water.
7	Indoor fan is not running at all.	1. Failure in motor capacitor. 2. No voltage out of P.C.B. assembly for fan motor. 3. Motor winding failure (check resistance).	1. Replace the capacitor. 2. Replace the P.C.B. assembly. 3. Replace the fan motor.
8	Compressor motor is not running at all	1. Failure in compressor motor magnetic contactor. 2. Compressor motor winding failure (check resistance).	1. Replace faulty contactor. 2. Replace the compressor.

10.4 Poor Cooling Troubleshooting.

	Symptom	Probable Cause	Corrective Action
1	Refrigerant flow failure	1. Refrigerant gas shortage. 2. Excessive overcharging of refrigerant. 3. Gas leakage. 4. Clogging of strainer or capillary tube. 5. 4-Way valve is defective. 6. Solenoid 4-Way valve is defective. 7. Compressor is defective.	1. Charge refrigerant gas. 2. Recharge gas. 3. Repair leakage. 4. Replace strainer. 5. Replace 4-Way valve. 6. Replace solenoid. 7. Replace compressor.
2	Air circulation failure.	1. Air filter is clogged 2. Air shutters are closed.	1. Clean air filter. 2. Open air discharge shutters.
3	Freezing Conditions at Evaporator Coil	1. Clogged air filter 2. Faulty capacitor. 3. Faulty fan motor. 4. Air discharge shutters are too closed. 5. Lack of refrigerant.	1. Clean filter. 2. Replace capacitor. 3. Replace fan motor. 4. Open air discharge shutters. 5. Check for leaks and add refrigerant.

10.5 Poor Heating Troubleshooting (Heat Pump).

	Symptom	Probable Cause	Corrective Action
1	Refrigerant flow failure	1. Refrigerant gas shortage. 2. Excessive overcharging of refrigerant. 3. Gas leakage. 4. Clogging of strainer or capillary tube. 5. 4-Way valve is defective. 6. Solenoid 4-Way valve is defective. 7. Compressor is defective.	1. Charge refrigerant gas. 2. Recharge gas. 3. Repair leakage. 4. Replace strainer. 5. Replace 4-Way valve. 6. Replace solenoid. 7. Replace compressor.
2	Air circulation failure.	1. Air filter is clogged 2. Air shutters are closed.	1. Clean air filter. 2. Open air discharge shutters.
3	Heating elements failure.	1. One or two hating stages are not operating.	1. a. Check electrical heating elements (resistance). b. Check contactors. c. Check the elements` time delay fuse.
4	Refrigerant low pressure.	1. Lack of water flow.	1. Check water filter.

11. CONTROL PROGRAMS and OPERATION INSTRUCTIONS

11.1 General

Protection: The air conditioner is protected by pressure and temperature sensors. The sensors cut off the unit once extreme and dangerous conditions are detected. The DISPLAY on the thermostat indicates the failure code as stipulated in the troubleshooting section.

Restart after power failure: Back-up memory keeps the working data. Once power returns, the air conditioner will restart and return to its saved data.
The unit can be modified to fail-safe manual restart after power failure (Start-Stop). Instructions for such modification are available upon request.

Reset and restart after failure: Once the unit has stopped due to failure, restart is possible after resetting. Reset the system by pressing ON/OFF button on the room thermostat. Call the technician for assistance should the failure be repeated.

Restart time delay: Compressor starting time delay is 1 min. at first start and 3.5 min. before each restarting. Timer accuracy is ±20 sec.

Evaporator fan control (only for Heat Pump unit): In cooling mode the fan runs continuously. In heating mode the fan stops running 15 sec. after compressor stop.

Evaporator fan control (only for units with electrical heating elements): In cooling mode the fan runs continuously. In heating mode the fan stops running 40 sec. after the heating elements are turned off.

Water temperature control (only for Heat Pump unit): Compressor stops if water temperature reaches below 4ºC. Compressor restart enabled at water temperature above 10ºC. Failure in water temperature sensor does not stop unit operation. If failure occurs 3 times per hour and/or holds for 1 full hour, signal of failure **ER8** will appear stable and On/Off press for re-start not allowed. Re-start only by shut-off and switch-on of power supply.

Heating control (only for units with electrical heating elements): The return air temperature sensor switches ON the first heating group at room temperature 1ºC lower than the set temperature. Heating is switched OFF at set point.
Second heating group is switched ON at room temperature 2ºC lower than the set temperature. Second heating group is switched OFF at 1ºC under set point.

Evaporator coil temperature control: Compressor stops at coil temperature below 0ºC. Compressor restart enabled at coil temperature above 8ºC.
Failure in evaporator coil temperature sensor does not stop unit operation.

Return air temperature sensor: Thermostats include an incorporated, build-in temperature sensing element. However, an external sensor (optional) can be added. In such case the operation of the unit is governed by the external sensor.
The thermostat temperature setting range is 16ºC to 30ºC.
Failure in return air sensor will cause the compressor to run continuously. If unit was set to "AUTO" operation mode, the compressor will not run.
If an external sensor is added, a system failure will occur only when both sensors are faulty.

Air-Flow protection (only for units with electrical heating elements): To protect the heating elements from overheating or from operating without flowing air.
A combination of differential pressure flow-switch and temperature sensor immediately cut off the heating elements in case the temperature or air-flow reaches the pre-set protection values. The fan continues running for additional 15 sec.

Low pressure protection: Low pressure compressor protection. Set value is 2.7 bar (40 psi). The compressor stops after 2 min. time delay. At each compressor re-start the system ignores LP entrance for 2 min. At heat elements mode, LP protection is not active.

High pressure protection: High pressure compressor protection. Set value is 24.8 bar (365 psi).The compressor stops immediately. At heat elements mode, HP protection is not active.

11.2 Modes of operation and uses

Setting the Temperature

The temperature may be adjusted within the range of 16ºC and 30ºC. Use temperature setting pushbuttons (+) to increase and (-) decrease the temperature.

Cooling Mode

In this mode the air conditioner cools, dries and filters the air in the room. The set temperature is maintained.

Heating Mode

In this mode the air conditioner heats and filters the air in the room. The set temperature is maintained.

Auto Cooling/Heating Mode

In this mode the air conditioner automatically selects the cooling or heating position according to room conditions and set temperature.

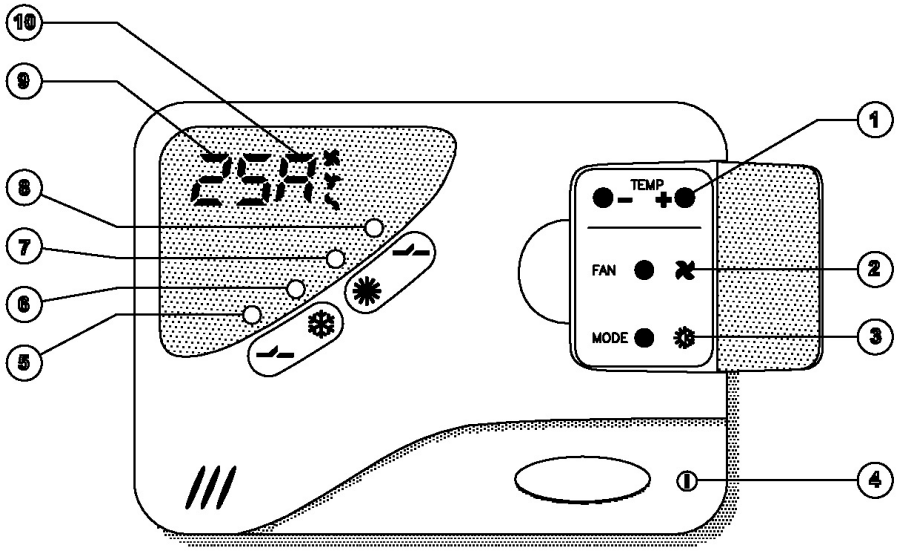
Auto Ventilation Mode

In this mode the air conditioner automatically changes the speed of the fan in accordance with the room temperature. At room temperature close to the set point the fan rotates at low speed while speed increases when room temperature is up.
Display shows "A"

Fan Only (Ventilation) Mode

The air conditioner maintains continuous air flow, without cooling or heating. Display shows "F".

11.3 Wall Mounted Thermostats α 260U



1. Temp	Temperature setting pushbuttons: (+) to increase and (-) decrease the temperature setting. Simultaneous pressing of both (+) and (-) buttons will display the actual room temperature.
2. Fan	Fan speed select pushbutton. Available speeds are Slow, Medium, High and Auto.
3. Mode	Selection pushbutton for mode of operation. Available modes are Cooling, Heating, Auto and Fan.
4. On/Off	Pushbutton for turning the unit on and off. This pushbutton is also used for failure canceling.
5. "Active Cool" LED	Cooling operation indicator LED. LED ON indicates that the unit is cooling. LED Blinking indicates delayed cooling action. LED OFF indicates no cooling demand.
6. Cooling LED	This LED is ON in cooling and in Auto modes. In the rest of the modes the LED is OFF.
7. Heating LED	This LED is ON in heating and in Auto modes. In the rest of the modes the LED is OFF.
8. "Active Heat" LED	Heating operation indicator LED. LED ON indicates that the unit is heating. LED Blinking indicates delayed heating action. LED OFF indicates no heating demand.
9. Display-Temp.	The first two digits display the set temperature. Simultaneous pressing of both (+) and (-) buttons will display the actual room temperature.
10. Display-Fan Pos.	Display of fan position. **A** Fan in Auto High Speed Medium Speed Low Speed **F** Unit in FAN mode

NOTES

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